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Estimating Statistics of MILK CONSUMPTION in Relation to Trends in Fluid Milk Marketing

U.S. DEPARTMENT OF AGRICULTURE
Economic Research Service
Marketing Economics Division

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SOURCES OF CURRENT STATISTICS ON MILK CONSUMPTION

Economic Research Service

The National Food Situation. Quarterly.
The Dairy Situation. Bimonthly.

Statistical Reporting Service

Fluid Milk and Cream Report. Monthly.
Milk--Production, Disposition, and Income. Annually, in April.

Agricultural Stabilization and Conservation Service

Federal Milk Order Market Statistics. Monthly.

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SUMMARY

Milk consumption statistics published by the U. S. Department of Agriculture have evolved considerably over the past 40 years. Sources of data and the amount of detail in the estimates have changed with changes in marketing practices and in response to growing needs for information on which to base marketing decisions.

Surveys of local health officials, records of milk price control agencies, and information obtained under an order which regulated sales of fluid milk and cream during World War II provided the basis for several stages in developing present estimating methods. Markets having Federal milk marketing orders are now important sources of information on milk consumption. These markets provide the basis for estimates of consumption of individual fluid dairy products and for individual marketing areas, as well as for national estimates. Many State agencies also compile data on milk consumption.

Some aspects of milk consumption can only be studied on the basis of detailed surveys of householders or institutional and industrial users. Some of the national estimates show separate estimates for quantities used by the military, or in such programs as school lunch and special milk. Data obtained from a single class of users cannot be compared directly with marketwide or national estimates. The two kinds of data serve different purposes. With increasing detail in the data, however, the marketwide and national data are becoming more useful.

Milk consumption data have a bearing on many current marketing developments: The shifting relative importance of milkfat and solids-not-fat; the possible impact of new types of sterilized, concentrated, or dried whole milk; and changes in container sizes and types, channels of sale, and pricing policies. Improvements in the procedures for reporting sales and estimating consumption have made the national data increasingly useful for evaluating such developments.

ESTIMATING STATISTICS OF MILK CONSUMPTION IN RELATION TO TRENDS IN FLUID MILK MARKETING

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INTRODUCTION

Many decisions in dairy marketing depend on information about rates of milk consumption, and the U. S. Department of Agriculture has been providing such information for nearly 40 years. During that time, the kinds of information that it has been practicable to gather and the demands of the users have both changed. This report is intended to familiarize users with the information on milk consumption currently being published by the Department.

The Department's data on milk consumption are varied as to type, timing, and coverage. The basic series is that on the national average per capita consumption of fluid whole milk and cream in terms of milk equivalent. There is also a national average series for fluid whole milk, one for cream, and another for fluid milk items containing less butterfat than whole milk. There are data on sales of milk, cream, and low-fat products from marketing areas having Federal milk marketing orders, and from some State regulated and unregulated markets.

Timing of release of the milk consumption data varies with the series. Forecasts of milk consumption are released in the National Food Situation and the Dairy Situation early in the year. Estimates of farm and nonfarm consumption are published for the preceding year in the April issue of the Fluid Milk and Cream Report. Some of the data for individual markets have only been published in special reports at intervals of two or more years.

The Department's milk consumption statistics have evolved through a series of stages which are described briefly in the following pages. The evolution is still going on, and the rest of this report tells of some of the problems involved in improving the flow of current data on sales of milk and related fluid products. Changing patterns of fluid milk marketing have had diverse effects on the nature of the reporting and estimating job. Some developments, like the introduction of marketing orders, yield improved statistics as a byproduct. Other developments, like the growing diversity of fluid milk products and the spreading and overlapping of local markets, make reporting more difficult. Always, the demand for information seems to run ahead of the capacity to provide it with the resources available, but this demand also contributes to the continuing evolution of the methods used, the concepts represented, and the amount of information that is compiled.

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Much of this report was originally presented at a symposium on dairy marketing research sponsored by the American Dairy Association in Chicago, Ill., October 31, 1961.

STAGES LEADING UP TO THE PRESENT ESTIMATES

Health Officer Data

In June 1924, the Department issued from the Bureau of Agricultural Economics a report on consumption of milk and cream in cities and on consumption of dairy and poultry products on farms for 1923 (2) 2/. The data on consumption of milk and cream in cities were compiled from reports of health officials in more than 200 cities. This was the first major milestone toward present procedures for compiling and estimating milk consumption data.

Stocktaking in 1938

Health officers' data were compiled yearly until into the 1930's. By 1938, Gordon Sprague and Gertrude Foelsch had examined the procedures then in use and the next stage was marked by their report on "Estimating Yearly Changes in Fluid Milk and Cream Consumption in Cities and Villages," (3). They directed attention at two critical aspects of this effort: (1) The problem of estimating the populations residing in the marketing areas for which consumption data were reported; and (2) the problem of obtaining adequate statistics of the quantities of fluid milk and cream distributed.

Sprague and Foelsch were optimistic about the consumption estimates. They said, "The estimates of fluid milk consumption are based primarily on reports by Board of Health authorities. The accuracy of their reports depends on very careful and detailed accounts kept by milk dealers. There is evidence that accuracy in this field is increasing and that eventually information on utilization of surpluses may be added to the present estimates. Many Board of Health officers already have sufficient records available to make complete and consistent records each year." Nevertheless, they seemed uneasy because independent surveys did not agree with some of the Board of Health data. They further noted, "The population problem in regard to these estimates is serious and..... no immediate solution is evident." They hoped that the 1940 census would give them a good benchmark for their per capita consumption rates. Despite their hopes, some of the per capita consumption data went underground at this point. The city and regional estimates which had been published in previous years were discontinued, but the Board of Health data continued to be used as a basis for national estimates.

2/ Underscored numbers in parentheses refer to Literature Cited, page 12. Sources of current statistics are listed on page i.

The Northeastern Report

About this time (1940), the Northeastern Dairy Conference urged the Bureau of Agricultural Economics to develop a report on the consumption of milk and cream in the Northeastern States. E. E. Vial and R. J. Foote prepared a report, published in 1942, which covered consumption of fluid milk and cream in northeastern marketing areas through 1940 (11).

Vial and Foote used Board of Health reports, records of producers' cooperative associations, data on market receipts compiled by the Market News Service, and records of State and Federal milk control agencies. The kind of sources available varied from market to market. The earliest milk price control programs came into use in 1933. Some did not begin until much later. Thus, Vial and Foote's report covered varying periods of time. The series for New York began with data for 1927, Boston and Philadelphia with data for 1929. Thirteen markets were included, and the data were given by months. Considerable effort was expended on the estimates of the population residing in the marketing areas covered. Some of the data were on a statewide basis, and the population data were adjusted to exclude persons on farms where cows were kept.

"Consumption of Fluid Milk and Cream in Northeastern Marketing Areas," was the title of a series of reports published on an intermittent basis. In the title of the 1960 report, "Selected" replaced "Northeastern" (4). The change reflected the addition of data for States and marketing areas from the Carolinas in the East to Texas and Washington in the West.

War Food Order 79

The succession of publications from Vial's first report to the 1962 report may be the main line of evolution of the Department's future reports on fluid milk consumption. But another stage was passed on a converging road. This was P. E. O'Donnell's report on nonfarm consumption of fluid milk and cream which appeared in May 1954 (1). Exploiting a statistical windfall from World War II--the records of War Food Order 79--O'Donnell and his collaborators George Day, Florence Fogelson, and Mardy Myers produced estimates of fluid milk and cream consumption for 114 marketing areas. From these area estimates, and with some reliance on health officer data for areas not otherwise covered, State estimates of consumption were made for 1944. This was an important benchmark for nonfarm consumption of milk and cream. The nonfarm sector accounts for 85 to 90 percent of the total consumption of fluid milk and cream.

Federal Milk Marketing Order Statistics

The evolution of Federal milk marketing order statistics represents another stage in the development of milk consumption estimates, although it is not as distinctly tied to a specific date as the work of Pirtle, Sprague and Foelsch, Vial and Foote, and O'Donnell. Federal order statistics were published only by the individual milk market administrators until June 1949 when the Department's report "Fluid Milk Prices in City Markets," (now the "Fluid Milk and Cream Report") carried sales data for April 1948 and 1949. This was the beginning of a continuing effort to have the data for all markets reported on a comparable basis, to have sales related to a defined marketing area so that they could be converted to a per capita basis, and to have them reported on a product pounds basis with butterfat percentages. It was mainly the improvement in the Federal order market statistics that made it possible to replace the adjective "Northeastern" with the adjective "Selected" in the consumption report referred to above.

MILK CONSUMPTION DATA CURRENTLY AVAILABLE

Out of the evolution described in the preceding pages, the Department has developed and publishes national totals and average per capita consumption for fluid milk products, as well as totals and averages for some States and local marketing areas. Some of the series include estimates for years as far back as 1909; others, particularly for individual markets, go back only 1 or 2 years.

National Totals and Averages

The longest series of milk consumption estimates are national totals and per capita averages for milk equivalent of fluid milk and cream, and for the following separate items or product classes: fluid whole milk, fluid cream, and "skim milk or low-fat items."

The data on milk equivalent of milk and cream were first published as separate series in 1949 (6). For years up to 1942, cream consumption was estimated as accounting for 20 percent of all milk used in fluid products, and it was assumed that milk containing 4 percent of butterfat was used to make cream containing 25 percent of butterfat. For 1943-45, the estimates of cream consumption reflected the effects of wartime food regulations. For later years, the proportion of milk equivalent used for cream, and the fat contents of the milk used and of the cream produced were varied on the basis of data from government-regulated fluid milk markets.

The current series on skim milk or low-fat items consolidates and revises what previously was published as four separate items, namely, skim milk, cultured buttermilk, skim milk in chocolate drinks, and natural buttermilk. The basic data and "indications" used in the original estimates varied widely in kind and quality. Despite some improvements in the basic data, it came to be felt that publishing the separate series might be misleading.

Individual Markets

The second principal category of consumption data is the individual market data carried in "Fluid Milk and Cream Consumption in Selected Marketing Areas." Such data have their counterparts outside the Department in series developed by workers in State agricultural experiment stations and others who work closely with individual markets.

HOW THE NATIONAL AVERAGES ARE ESTIMATED

Three steps, roughly, are used in estimating the per capita consumption in the basic series for fluid milk and cream. The first step is to prepare a tentative estimate of total nonfarm consumption. The tentative estimate itself is a blend of two indications, one prepared from data on total sales, and one prepared from data on per capita rates of consumption. All available data on total sales of milk and cream for Federal order markets and for some States or State-controlled markets are converted to a milk equivalent basis. These total sales figures are related to the comparable sales in the same areas during the previous year, which in turn have been linked to the 1944 benchmark estimates. The indicated total nonfarm sales for the United States are derived from the ratio of sales during the current year to those of the previous year in areas having current data on total sales. Beginning with the estimates for 1960, another indication has been compiled by using the average per capita rates shown by markets reporting in each region. These rates are multiplied by the nonfarm population of each region. The result of this computation furnishes the second indication of nonfarm consumption for the United States. The two indications are reconciled to provide the tentative estimate of nonfarm consumption, which may be further modified in step three below.

Although some regional estimates are made as part of the foregoing procedure, the basic data for some regions are not adequate for publication of the separate estimates. Current data on sales cover too small a proportion of sales in some regions. Also, information about movements of milk across State or regional boundaries is incomplete.

Step two is to estimate the quantities of milk consumed in farm households. The farm use is estimated in two parts: Quantities consumed on farms with cows, and quantities used on farms without cows. The benchmarks and current indications for this segment of the total consumption are less distinct than those for nonfarm consumption. They depend more heavily on current surveys of quantities used by farm households, on the household food consumption survey of 1955 (7), and on consistency with the estimates of farm production and disposition as trued up in accordance with census indications. Information on current changes in the rate of consumption on farms with milk cows is obtained from replies of crop reporters to semiannual questions. The estimated rates of consumption on farms from these indications, in conjunction with the estimated population on farms, give the estimate of total consumption of milk and cream on farms.

The third step is a balancing of the tentative estimates of nonfarm and farm consumption plus the milk equivalents of manufactured products and other uses with total production. For earlier years, the estimates of production and of quantities sold by farmers are considered more reliable than the estimates of consumption. However, the data generated by Federal and State programs have significantly improved the coverage and accuracy of fluid milk and cream consumption data in recent years.

The data on quantities of whole milk sold by farmers and delivered by them to plants and dealers come from an extensive enumeration of the dairy plants in most States, and from less complete data in the remaining States. The figure for quantities retailed by farmers is based on sample data, for most States, rather than enumerations. The estimates of milk used for manufactured dairy products (milk equivalents) are based on an enumeration of production data covering nearly all manufacturing plants. The difference between the quantity of milk and cream sold by farmers (wholesale and retail) and the quantity of milk used for manufactured products indicates fairly closely the total quantity of milk equivalent used for fluid milk and cream in urban markets. This difference does not agree precisely with use in urban markets because some of the milk and cream processed by dealers is sold to people on farms without cows (and some to people on farms with cows). Finally, the estimates of nonfarm consumption of fluid milk and cream, milk consumed in farm households, used for farm-churned butter, fed to calves, and the milk equivalents of manufactured products are combined and compared with the estimate of total milk production. Any wide differences are reconciled at this point.

The categories of production somewhat overlap the categories of utilization. Parts of both are estimates rather than enumerations. Consequently, production and utilization are not expected to agree exactly. A residual is allowed for miscellaneous minor uses and any inaccuracies of the independently determined production and use items. In recent years, this has usually ranged between 500 and 900 million pounds, equal to about one-half of 1 percent of total production.

The procedure just described estimates the total milk equivalent of milk and cream products used for fluid purposes in the United States by the total population, civilian and military. Within this total, separate estimates are made for consumption by the military, for sales under some government programs, and for some individual fluid products.

Military consumption is estimated separately for those eating in service halls and those eating elsewhere. Sales under the school lunch and special milk programs are known from the government program records. These data are useful for distinguishing the effects of these programs from the effects of factors which influence consumers who purchase through ordinary commercial sources.

Estimates of individual fluid products (fluid cream, skim milk, or low-fat products) within the overall group also rely on the 1944 benchmark data. Again, the change in the series from the benchmark period is estimated largely from Federal order milk market statistics. The fact that the Federal milk markets now account for approximately two-thirds of the fluid milk consumption and sales, and that the data come from enumerations definitely limits the margin of error in estimating the total quantities. However, the estimating of consumption on farms for these categories is particularly troublesome, especially for natural buttermilk, which is no longer published separately.

RECONCILING NATIONAL AND SINGLE MARKET DATA

One of the challenging problems in estimating milk consumption is that apparent rates of consumption in individual markets may differ greatly from national data. Some factors making for discrepancies are: Difficulties in getting accurate population data for individual market areas; differing patterns of sales for individual items and for total milk or milk equivalent of milk and cream; and differences between household consumption and use in other outlets.

Size of Market

Figures on the total quantity of milk sold by dealers in an individual market may themselves be quite accurate, yet misleading as to what they mean. If the size of the market is changing and the change not accurately measured, both total sales and per capita rates may be misinterpreted.

There have always been difficulties in this respect. The area within which the sales occur has always been subject to some uncertainty and this uncertainty has been compounded in the last 10 to 15 years as milk distributors have expanded their distribution routes far beyond the urban territory in which their plants are located.

Milk Equivalent Versus Separate Items

We have additional problems brought about by the heterogeneity of the category "milk and cream." In an earlier day when milk processing was simpler, a milk dealer took into his plant a certain quantity of milk and either processed it as whole milk or separated it and sold cream. It made sense to report the total volume of milk handled and processed and sold as milk and cream. Nowadays, as milk dealers' operations have become more complex, the volume of milk handled does not agree so directly with statistics based on sales. Sales must be converted to milk equivalents where the milk itself was standardized from the test of milk received, and where the milk is separated and sold as such products as cream, milk drinks, and cottage cheese. It is simpler now to compile sales of the individual items separately.

Household Surveys

Some of the early dissatisfaction with the aggregate estimates of milk consumption was a result of discrepancies between the reported sales data and the information obtained in household surveys. Investigators, as early as the 1920's, checked up on their respondents by comparing the quantities reportedly purchased from home delivery routes with milk dealers' actual route records. They found that the responses in household surveys were prone to bias. There are other difficulties in gaging the accuracy of consumption estimates with household surveys. Consumption data obtained from household interviews have to be converted to milk equivalents to be comparable with the older data from health officers for milk processed into milk and cream. Where we have data on market sales of individual products, we can compare the market data with household data item by item, without calculating milk equivalents, and milk purchases by householders can be compared directly with the reported sales of milk. But, another difficulty remains: others than householders buy milk. To make a survey match with dealers' total sales, we have to allow for quantities consumed away from home, used for cooking in eating places, or used by candy makers, soup manufacturers, etc.

Conversion Factors

We cannot avoid entirely the problems that come about because there is such a variety of milk and cream products on the market. Even though we compile separate sales data for each product, it is still necessary to reconcile the sales data with the milk utilization data, and we still depend on having milk equivalent conversion factors. Variation in the butterfat content among different types of milk and of cream once was the principal source of difficulty in arriving at satisfactory conversion factors. With the growing practice of fortifying some of the milk products by adding nonfat solids, we have an additional complication to contend with. At one time, it was sufficient to account for the butterfat in milk sold; today, it is increasingly necessary to account for solids-not-fat also.

FEDERAL MILK MARKETING ORDER STATISTICS

One of the developments in milk marketing that helped most to make better milk consumption data possible was the introduction of Federal milk marketing orders. The Agricultural Marketing Agreements Act of 1937 authorized the inclusion in milk marketing orders of terms providing for market information to producers.

Prior to June 1949, many of the milk market administrators published milk sales data for their own markets. Some of these reports began with the earliest forms of Federal regulation of milk markets in 1933, and others began with the first orders in 1936. Beginning in June 1949, the Department began publishing data for individual markets in the Fluid Milk and Cream Report. The 1949 data consisted of total sales of whole milk and of skim milk items on a product-weight basis and of cream on the basis of pounds of butterfat. These were the sales of regulated handlers in 19 Federal order markets. They excluded sales by unregulated handlers, chiefly producer-distributors buying no milk from other producers. The omission was not considered serious. The data for the 19 markets included total sales, whether inside or outside the defined marketing area.

Since 1949, the published Federal order statistics have been refined in several ways. Beginning in 1950, sales within the marketing areas were segregated and reported separately for 8 markets. By 1954, 26 markets were reporting their sales on the basis of the defined marketing areas, and no data were used where out-of-area sales were not segregated. In 1961, in-area sales were being reported for 65 markets. Beginning in 1954-55, sales of fluid cream were reported on a product-pounds basis instead of on the basis of butterfat contained. Also, at this time, the sales of milk and cream mixtures began to be reported in terms of product pounds.

Since January 1960, statistics of sales of dairy products in Federal milk marketing orders have been published monthly in "Federal Milk Order Market Statistics." The sales data in this report are for whole milk, skim milk and milk drinks, milk and cream mixtures, and cream on a within-area basis for the current month, the preceding month, and the corresponding month of the preceding year. These data are comparable to the comprehensive compilation, "Federal

Milk Order Market Statistics, 1947-56," issued in May 1959. Supplements to this Statistical Bulletin No. 248 were issued for the periods 1957-58, 1959, and 1960 (5). The data are also published in "Dairy Statistics" (9), and the Department's annual Agricultural Statistics (8).

It has required a great deal of effort to develop comparable and current fluid milk consumption data as a byproduct of Federal milk market regulation. Market administrators file monthly sales reports to the Milk Marketing Orders Division. This information is reported on a product pounds basis and may differ substantially from sales on the basis of class use. These reports contain considerable information above that needed for administering the orders.

The main purpose of the orders is to establish and verify the prices paid to milk producers by handlers. The orders differ with respect to what is required for adequate verification. They generate sales data mainly as an incidental step to verifying the use which handlers claim to have made of the milk purchased from producers. Some orders have operated on the concept that it was sufficient only to verify the handlers' claims about milk used for the products in the lower priced classes, since milk for fluid use is in the highest price class of use. Such a method of accounting would not by itself generate data on sales of separate milk and cream items. Under other orders, it has been the practice to verify the use of milk in Class I by auditing milk dealers' route sheets and other records of disposition of milk and cream. But even here the sales could be audited without compiling aggregate sales data for the market. Also, the necessary auditing might not have been completed until a year or more had elapsed so that the data would not be current even if they were complete. Other refinements necessary for satisfactory sales data are often superfluous for an adequate audit of use. Thus, in some markets the auditing has been carried out in terms of pounds of butterfat. Similarly, it generally does not matter for pricing purposes whether the Class I sales were made within the marketing area or outside.

Sales by all milk handlers regulated under Federal milk marketing orders in 1961 amounted to approximately half of the total consumption of fluid milk in the United States. Markets which reported out-of-market sales, and some details of within-area sales, accounted for about two-fifths of total consumption. Where out-of-market sales were being reported in 1961, they accounted for about 13 percent of total sales of the regulated handlers.

Sales by Handlers Not Regulated Under Federal Orders

State milk control programs regulate many markets that do not have Federal orders. As in some Federal orders, not all of the State programs yield satisfactory statistical information on milk sales. Many of the States do not now compile or publish data from the reports which the regulated handlers are required to make. In some markets, the classification of the reported data is not consistent with the categories used in the consumption estimates. In other markets, market boundaries, inter-handler transactions, and other problems prevent the data from being added to the existing reports. The Department is cooperating with several States which are interested in compiling data for their own markets, or in making existing data more useful. A few States which do not control milk prices do compile statistics on fluid milk sales. Some of the results of these various State activities were published in "Fluid Milk and Cream Consumption in Selected Marketing Areas, 1950-59" (10).

How Milk Consumption Data Are Used

The facts about milk consumption bear on a wide range of interests--those of farmers, milk dealers, and consumers, individually and through their organizations, and those of legislators and other public officials. Mounting interest in milk solids-not-fat, for instance, helped make obsolete the simple category "milk equivalent of fluid milk and cream" which once sufficed for describing trends in the fluid milk industry. The dairy industry may have to change its pricing and promotional policies to reflect the growing interest in milk solids-not-fat, but just what should be done may depend on how rapidly the situation is changing, and on the market response to changes in prices, advertising, and other factors. Data are needed for separate products nationally and for smaller areas in order to detect promptly and accurately the nature of the underlying trend and the effects of new industry practices.

New types of whole milk--sterilized, concentrated, or dried--are in various stages of laboratory development. One of the biggest questions which such products raise is "What will happen to milk consumption?" Since these products are likely to be introduced in some areas well before they are introduced in others, their effects may be measurable in local market data long before becoming apparent in national data.

Other kinds of innovations in milk marketing, also, are looked at from the standpoint of effects on milk consumption. Gallon containers, sales through stores, and seasonal changes in retail prices, have all been advocated by some and attacked by others on the basis of the effects they are supposed to have on consumption. It may be doubtful whether milk consumption data ever could provide the final answer to these questions, but as long as the questions remain, they will be a challenge to our estimating methods.

Students of the data have been impressed by the fact that milk consumption changes very slowly and by small amounts. Since 1948, the largest year-to-year change in per capita consumption of fluid milk and cream was the 10-pound decrease from 1960 to 1961. This was a change of only 3 percent. The small year-to-year changes in the national data could be influenced substantially by changes in the less-accurately measured components of the data: Consumption on farms where no cows are kept, numbers of farms keeping cows, inclusion of farms in marketing areas regulated by Federal milk marketing orders, and consumption in urban areas for which accurate current statistics are not now being compiled. The remaining changes in milk consumption, small as they are, show not only the effects of new marketing practices, but also the net result of shifts among segments of the population that consume milk at different rates. Young people, higher income groups, and some ethnic groups consistently show higher-than-average rates of consumption. There are also regional differences not accounted for by age, income, ethnic, and rural-urban differences. Surveys of consumers have shown other ways of classifying users and nonusers of milk to throw light on factors affecting milk consumption.

Milk consumption data are used to show the level and trend of milk usage, and, as far as possible, to relate these to new developments, marketing innovations, and other factors that may affect consumption. Because year-to-year changes are typically small, many of the effects are lost in the overall national data. Making milk consumption statistics more useful for marketing decisions requires improvements on two frontiers: Adding detail and enlarging the number of local markets for which data are published.

Improvements in the reporting and estimating procedures were summarized in the section of this report on pages 2 to 4. These improvements have made the national data increasingly useful. Reliable data are now available for many more markets than formerly, and further progress may be expected.

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